ODIN MOT4 02
Fiber Optic Transmitter for MOST®

AVAGO TECHNOLOGIES

Data Sheet

Description

The 4-pin MOST Optical Transmitter (ODIN MOT4 02) is a highly integrated CMOS IC combined with a high speed LED designed to transmit up to 25 Mbit/s optical data which is biphase coded (up to 50 Mbaud). The internal peaking circuit minimizes PWD. The current through the LED will be setup by an external resistor connected to VCC. This makes it possible to control the optical output power of the LED. The power supply voltage is either 3.3V or 5.0V. The power down mode switches the part into a low power mode if electrical data is not received.

Applications

- Optical Transmitter for MOST Systems

Features

Excellent solution for converting high speed data from TTL to Plastic Optical Fiber (POF)

- Operating @ 3.3V or 5V Power Supply
- High speed transvter up to 25 Mbit/s net data rate (50 MBaud)
- 95°C operating temperature over whole life time
- TTL Data Input (Logic to Light Function)
- Power down mode
- Duty Cycle Adjust (DCA), yields to enhanced SP1 input range
- 650 nm for working in a low attenuation range of PMMA Fiber
- High coupled power in 1000 micron plastic fiber
- Fully compliant to "MOST® Specification of Physical Layer Rev 1.1"
- RoHS compliant (Lead free and halogen free)

Safety Hints

Applications of new chip technologies lead to increasing optical efficiency and growing and higher levels of optical performance. We therefore recommend that the current versions of the IEC 60825-1 and EN 60825-1 standards are taken into account right from the outset, i.e. at the equipment development stage, and that suitable protection facilities are provided.

Table 1. Absolute Maximum Ratings

		Limit Values		
Parameter	**Symbol**	**min.**	**max**	**Unit.**
Supply Voltage	V_{CCMax}	-0.5	6.0	V
Storage Temperature Range	T_{STG}	-40	100	°C
Soldering Temperature (>2.5 mm from case bottom t ≤ 10s)	T_S	–	260	°C
Voltage at any PIN		-0.5	V_{CC} +0.5	V
Electrostatic Discharge Voltage Capability[1]	ESD	–	2.0	kV

Notes:
1. ESD Capability for all Pins HBM (human body model) according JESD22-A114B.

Table 2. Recommended Operating Conditions

		Limit Values		
Parameter	**Symbol**	**min.**	**max.**	**Unit**
Supply Voltage low	V_{CC_l}	3.135	3.465	V
Supply Voltage high	V_{CC_h}	4.75	5.25	V
Operating Temperature Range (ambient)[1]	T_A	-40	95	°C

Notes:
1. For details see application note "Handling, Storage, Operating and Processing Application Note of ODIN MOST4 Transceiver"

All the data in this specification refers to the operating conditions above and over life time unless otherwise stated.

Table 3. DC Characteristics

		Limit Values			
Parameter	**Symbol**	**min.**	**typ.**	**max.**	**Unit**
Low Level Input Voltage	V_{IL}	-0.3	–	0.8	V
High Level Input Voltage	V_{IH}	2.0	–	V_{CC} + 0.3	V
Input Leakage Current(V_{CC} = 5.0 V, V_I = 0.0 V or V_I = 5.0 V)	I_L	–	–	± 20	µA
Input Capacitance	C_I	–	–	7	pF
Input Resistance	R_I	2	–	–	kΩ
Supply Current (R_{ext} = 15 kΩ) ON state, biphase coded data[1]	I_{CC}	–	–	35	mA
Supply Current (R_{ext} = 15 kΩ) OFF state[2]	I_{LP2}	–	–	20	µA

Notes:
1. The current through the LED and therefore the optical output power and overall power consumption depends on the settings of R_{ext}. The nominal value for R_{ext} is 15 kΩ. With R_{ext} = 30 kΩ the optical output power is about -3 dB of the nominal value. Typical behavior see Figure 1. **Important: The external resistor of R_{ext} must be within the range of 13.5 kΩ to 33 kΩ. For values of R_{ext} out of this range functionality may not be given over the whole temperature range and the device lifetime. Using values below 13 kΩ for R_{ext} can damage the transmitter.**
2. If the transmitter is in full power mode it is switched OFF 1 ms (max.) after TX DATA is low. If the transmitter is in low power mode it is switched ON 6 ms (max.) after TX DATA transmission starts.

Attention

Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Between 3.465V and 4.75V the device is not specified according Table2. Therefore operation is limited to the range of 3.135V ... 3.465V or 4.75V ... 5.25V.

Table 4.1 AC Electrical Characteristics 45Mbaud (44.1kHz)

		Limit Values				
Parameter	**Symbol**	**min.**	**typ.**	**max.**	**Unit**	**Test Conditions**
Power Up Time	T_{PU}	–	0.016	6	ms	Zero -->MOST
DataPower Down Time	T_{PD}	–	0.01	1.0	ms	MOST Data -->Zero

Optical Signal Characteristics

(22.5 Mbit MOST Data, V_{CC} = 3.135 ... 3.465 V or 4.75 … 5.25 V, R_{ext} = 15 kOhm)

		Limit Values			
Parameter	**Symbol**	**min.**	**typ.**	**max.**	**Unit**
Peak wavelength	λ_{Peak}	630	650	685	nm
Temperature coefficient λ_{Peak}	TC_{λ}	–	0.16	–	nm/K
Spectral bandwidth (FWHM)	$Delta_{\lambda}$	–	20	30	nm
Average Output Power coupled into plastic fiber [1]	P_{opt}	-9.0	-5.2	-2.0	dBm
Average Output Power coupled into plastic fiber (if Rext = 13.5k is used instead of Rext = 15k)[1]	P_{opt}	-8.5	-4.7	-1.5	dBm
Optical Output Power "Light off"[2]	P_{off}	–		-50	dBm
Optical Rise Time (20% - 80%)[4]	t_r	–	2.5	6	ns
Optical Fall Time (20% - 80%)[4]	t_f	–	3.5	6	ns
Extinction Ratio[4][6]	r_e	10	12	–	dB
Pulse Width Variation [3][4][5]	t_{PWV}	20.0	–	24.3	ns
Average Pulse Width Distortion[3][4]	t_{APWD}	-1.4	–	1.4	ns
Data Dependent Link Jitter[3][4]	t_{DDJ}	–	0.20	0.77	ns
Uncorrelated Link Jitter[3][4]	t_{UJ}	–	0.05	0.33	ns
Positive Overshoot within 0UI..2/3UI[4][6]		-20	–	40	%
Negative Overshoot within –1UI..–1/4UI[4][6]		-10	–	20	%
High Level Signal Ripple between 2/3UI and 3/4UI[4][6]		-10	–	10	%

Notes:
1. Average value, when transmitting modulated light @ signal timing paramters. The output power coupled into plastic fiber P_{opt} is measured with a large area detector at the end of 30 cm POF fiber with a NA = 0.5, which is ideally coupled to the transmitter.
2. Average value, when signal on Tx_Data is low.
3. The electrical input signal has to fulfill following requirements: $t_{PWV(min)}$ = 20.1 ns, $t_{PWV(max)}$ = 24.1 ns, $t_{APWD(min)}$ = -1.5 ns and $t_{APWD(max)}$ = 1.5 ns, $t_{DDJ(max)}$.= 0.22 ns, $t_{UJ(max)}$.= 0.10 ns.
4. Characterized with Avago Characterization Boards as described in the Application note "Application Note MOST circuit for Avago ODIN Transceiver".
5. Limits for 2UI are 42.2 ... 46.4ns and for 3UI thay are 64.3 ... 68.5ns.
6. Top and Base level measured at least over 10UIs.

Table 4.2 Electrical Characteristics 49.152MBaud (48kHz)

		Limit Values				
Parameter	**Symbol**	**min.**	**typ.**	**max.**	**Unit**	**Test Conditions**
Power Up Time	T_{PU}	–	0.016	6	ms	Zero -->MOST
DataPower Down Time	T_{PD}	–	0.01	1.0	ms	MOST Data -->Zero

Optical Signal Characteristics

(24.576 Mbit MOST Data, V_{CC} = 3.135 ... 3.465 V or 4.75 … 5.25 V, R_{ext} = 15 kOhm)

		Limit Values			
Parameter	**Symbol**	**min.**	**typ.**	**max.**	**Unit**
Peak wavelength	λ_{Peak}	630	650	685	nm
Temperature coefficient λ_{Peak}	TC_{λ}	–	0.16	–	nm/K
Spectral bandwidth (FWHM)	$Delta_{\lambda}$	–	20	30	nm
Average Output Power coupled into plastic fiber [1]	P_{opt}	-9.0	-5.2	-2.0	dBm
Average Output Power coupled into plastic fiber (if Rext = 13.5k is used instead of Rext = 15k)[1]	P_{opt}	-8.5	-4.7	-1.5	dBm
Optical Output Power "Light off"[2]	P_{off}	–		-50	dBm
Optical Rise Time (20% - 80%)[4]	t_r	–	2.5	5.5	ns
Optical Fall Time (20% - 80%)[4]	t_f	–	3.5	5.5	ns
Extinction Ratio[4][6]	r_e	10	12	–	dB
Pulse Width Variation [3][4][5]	t_{PWV}	18.4	–	22.3	ns
Average Pulse Width Distortion[3][4]	t_{APWD}	-1.3	–	1.3	ns
Data Dependent Link Jitter[3][4]	t_{DDJ}	–	0.20	0.71	ns
Uncorrelated Link Jitter[3][4]	t_{UJ}	–	0.05	0.31	ns
Positive Overshoot within 0UI..2/3UI[4][6]		-20	–	40	%
Negative Overshoot within –1UI..–1/4UI[4][6]		-10	–	20	%
High Level Signal Ripple between 2/3UI and 3/4UI[4][6]		-10	–	10	%

Notes:
1. Average value, when transmitting modulated light @ signal timing paramters. The output power coupled into plastic fiber P_{opt} is measured with a large area detector at the end of 30 cm POF fiber with a NA = 0.5, which is ideally coupled to the transmitter.
2. Average value, when signal on Tx_Data is low.
3. The electrical input signal has to fulfill following requirements: $t_{PWV(min)}$ = 18.4ns $t_{pwv(max)}$ = 22.3ns, $t_{APWD(min)}$ = -1.3ns and $t_{APWD(max)}$ = 1.3ns , $t_{DDJ(max)}$ = 0.20ns and t_{UJ} = 0.09ns.
4. Characterized with Avago Characterization Boards as described in the Application note "Application Note MOST circuit for Avago ODIN Transceiver".
5. Limits for 2UI are 38.72 … 42.66ns and for 3UI are 59.06 … 63.01ns.
6. Top and Base level measured at least over 10UIs.

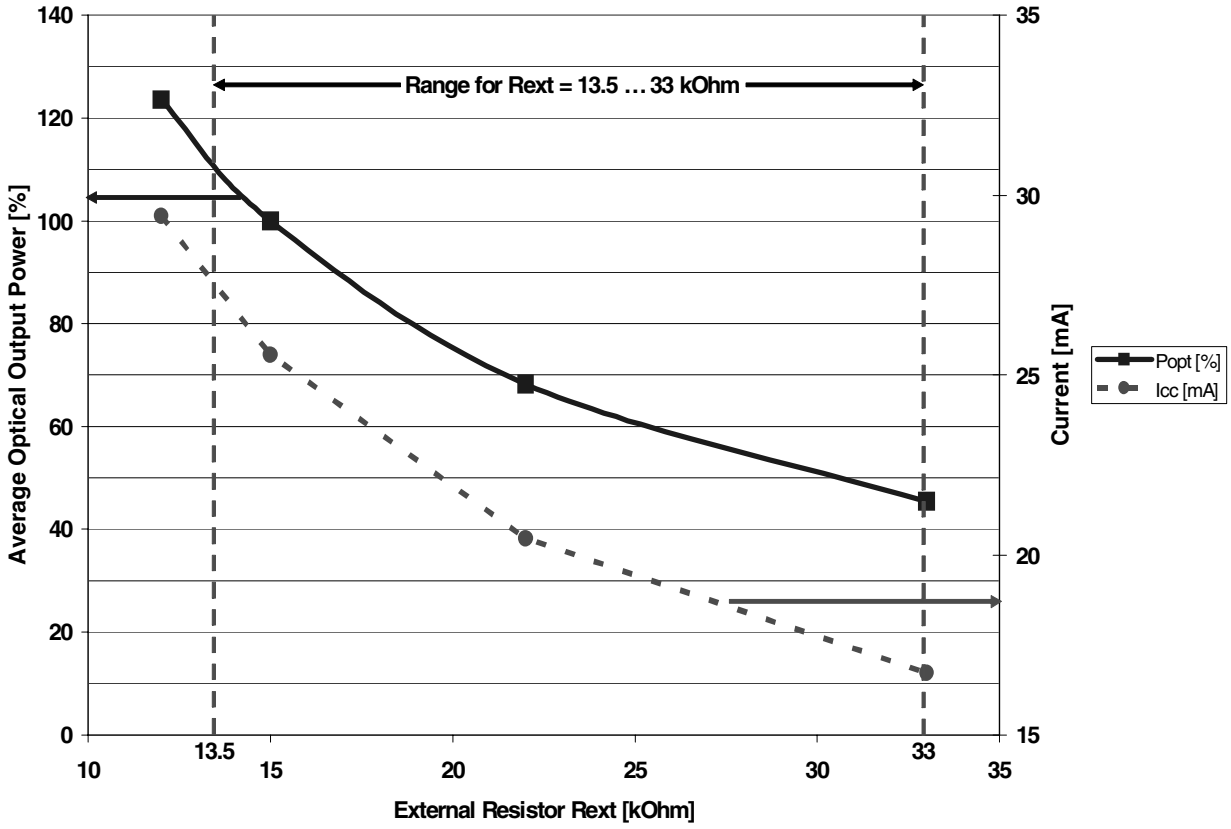
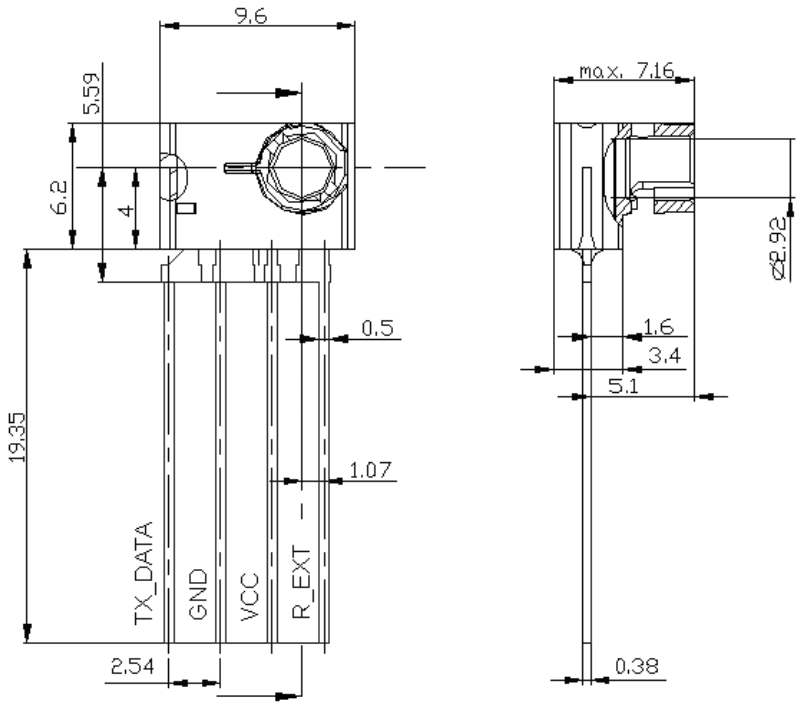


Figure 1. Typical Dependency of Average Optical Output Power P_{opt} and Supply Current versus External Resistor R_{ext} (22.5 Mbit MOST Data, V_{CC} = 5.0 V, T_A = 25 °C)

Package Outlines

ODIN MOT4 02(Cavity as Interface Package)



Dimensions in mm

For a more detailed drawing please contact Avago Technologies.

Disclaimer

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Information

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Revision History

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Page	Subjects (major changes since last revision)
3, 4	Rounding of numbers
7	Addition of “Revision History”

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